

November 30, 2017

IDI Gazeley
8 Corporate Park, Suite 300-34
Irvine, California 92606



**SOUTHERN
CALIFORNIA
GEOTECHNICAL**
A California Corporation

Attention: Mr. Stephen Hollis

Project No.: **17G206-2**

Subject: **Results of Infiltration Testing**
Rider 4 – Proposed Commercial/Industrial Building
SEC Redlands Avenue at Morgan Street
Perris, California

Reference: Geotechnical Investigation, Rider 4 – Proposed Commercial/Industrial Building, SEC Redlands Avenue at Morgan Street, Perris, California, prepared for IDI Gazeley by Southern California Geotechnical, Inc. (SCG), SCG Project No. 17G206-1, dated November 30, 2017.

Gentlemen:

In accordance with your request, we have conducted infiltration testing at the subject site. We are pleased to present this report summarizing the results of the infiltration testing and our design recommendations.

Scope of Services

The scope of services performed for this project was in general accordance with our Proposal No. 17P383 dated October 10, 2017. The scope of services included site reconnaissance, subsurface exploration, field testing, and engineering analysis to determine the infiltration rates of the onsite soils. The infiltration testing was performed in general accordance with ASTM Test Method D-3385-03, Standard Test Method for Infiltration Rate of Soils in Field Using Double Ring Infiltrometer.

Site and Project Description

The site is located at the southeast corner of Redlands Avenue and Morgan Street in Perris, California. The site is bounded to the north by vacant lot, to the west by Redlands Avenue, to the south by an agricultural field, and to the east by a flood channel. The general location of the site is illustrated on the Site Location Map included as Plate 1 of this report.

The subject site consists of an irregular-shaped parcel, approximately 37.93± acres in size. The site is currently being utilized or was recently utilized as an agricultural field. The current ground surface cover consists of exposed soil and extensive crop stubble. There is an existing water pump station located at the northwest corner of the site.

Detailed topographic information was obtained from a conceptual site plan prepared by Albert A. Webb Associates. This plan indicates that the overall site topography generally slopes downward to the southeast at an estimated gradient of less than 1 percent. The maximum site elevation is

1448± feet mean sea level (msl) located in the northwestern corner of the subject site, and the minimum site elevation is 1443± feet msl in the southeastern corner of the subject site.

Proposed Development

A site plan for the proposed development was provided to our office by the client. The plan indicates that the site will be developed with one (1) new warehouse building. The building will be located in the center of the site and will be 540,913± ft² in size. The building will be constructed in a cross-dock configuration with loading docks along both the east and west sides of the building. It is expected that the building will be surrounded by asphaltic concrete pavements for parking and drive lanes and Portland cement concrete pavements in the loading dock areas. Several landscape planters and concrete flatwork are expected to be included throughout the site.

We understand that the proposed development will include on-site infiltration to dispose of storm water. Based on the site plan provided and conversations with the representatives of Albert A. Webb Associates, the project civil engineer, the proposed infiltration system will consist an infiltration basin located in the southeastern corner of the site. The bottom of the proposed infiltration basin will be 13± feet below the existing site grades.

Concurrent Study

Southern California Geotechnical, Inc. (SCG) recently conducted a geotechnical investigation at the subject site, referenced above. As a part of this study, ten (10) borings were advanced to depths of 5 to 50± feet below existing site grades.

Native alluvial soils were encountered at the ground surface at all of the boring locations. The near-surface alluvium generally consists of loose to medium dense silty fine sands and fine sandy silts, extending to depths of 3 to 12± feet below existing site grades. At greater depths, the alluvium consists of stiff to very stiff silty clays and clayey silts. Interbedded layers of medium dense to dense sandy silts and silty sands as well as stiff to very stiff silty clays and clayey silts extend to at least the maximum depth explored of 50± feet.

Groundwater

Free water was encountered during drilling at a depth of 34± feet. Based on the water level measurements and the moisture contents of the recovered soil samples, the static groundwater table is considered to have existed at a depth of 34± feet below existing site grades at the time of the subsurface investigation. As part of our research, we reviewed available groundwater data in order to determine the historic high groundwater level for the site. The primary reference used to determine the groundwater depths in this area is the California Department of Water Resources website, <http://www.water.ca.gov/waterdatalibrary/>. Several monitoring wells are located within a mile radius of the subject site with high groundwater level readings ranging from 26 to 108± feet from the ground surface. Therefore, the high groundwater depth of 26± feet (February 2012) reported in a monitoring well located 0.9± miles southeast of the subject site is considered to be conservative with respect to the recent site conditions.

Subsurface Exploration

Scope of Exploration

The subsurface exploration for the infiltration testing consisted of three (3) backhoe excavated trenches, extending to depths of 12½ to 13± feet below existing site grades. The trenches were logged during excavation by a member of our staff. The approximate locations of the infiltration trenches (identified as I-1 through I-3) are indicated on the Infiltration Test Location Plan, enclosed as Plate 2 of this report.

Geotechnical Conditions

Native alluvium was encountered at the ground surface at all of the infiltration trench locations, extending to at least 13± feet below existing site grades. The native alluvial soils generally consist of medium dense to dense fine sandy silts and clayey fine to medium sands, and medium stiff to stiff silty clays and fine to medium sandy clays. Free water was not encountered during the excavation of any of the trenches. The Trench Logs, which illustrate the conditions encountered at the trench locations, are included with this report.

Infiltration Testing

We understand that the results of the testing will be used to prepare a preliminary design for the storm water infiltration system that will be used at the subject site. The infiltration testing was performed in general accordance with ASTM Test Method D-3385-03, Standard Test Method for Infiltration Rate of Soils in Field Using Double Ring Infiltrometer.

Two stainless steel infiltration rings were used for the infiltration testing. The outer infiltration ring is 2 feet in diameter and 20 inches in height. The inner infiltration ring is 1 foot in diameter and 20 inches in height. At the test locations, the outer ring was driven 3± inches into the soil at the base of each trench. The inner ring was centered inside the outer ring and subsequently driven 3± inches into the soil at the base of the trenches. The rings were driven into the soil using a ten-pound sledge hammer. The soil surrounding the wall of the infiltration rings was only slightly disturbed during the driving process.

Infiltration Testing Procedure

Infiltration testing was performed at all three (3) of the test locations. The infiltration testing consisted of filling the inner ring and the annular space (the space between the inner and outer rings) with water, approximately 3 to 4 inches above the soil. To prevent the flow of water from one ring to the other, the water level in both the inner ring and the annular space between the rings was maintained using constant-head float valves. The volume of water that was added to maintain a constant head in the inner ring and the annular space during each time interval was determined and recorded. A cap was placed over the rings to minimize the evaporation of water during the test.

The schedule for readings was determined based on the observed soil type at the base of each backhoe excavated trench. Based on the existing soils at each infiltration test location, the volumetric measurements were made at increments of 20 minutes. The water volume

measurements are presented on the spreadsheets enclosed with this report. The infiltration rates for each of the timed intervals are also tabulated on these spreadsheets.

The infiltration rates for the infiltration tests are calculated in centimeters per hour and then converted to inches per hour. The rates are summarized below:

<u>Infiltration Test No.</u>	<u>Mean Sea Level (feet)</u>	<u>Soil Description</u>	<u>Infiltration Rate (inches/hour)</u>
I-1	1431	Clayey fine to medium Sand	1.0
I-2	1430.5	Fine to medium Sandy Clay	1.7
I-3	1431	Clayey fine to medium Sand, trace Silt	1.4

Laboratory Testing

Grain Size Analysis

The grain size distribution of selected soils from the base of each infiltration test trench has been determined using a range of wire mesh screens. These tests were performed in general accordance with ASTM D-422 and/or ASTM D-1140. The weight of the portion of the sample retained on each screen is recorded and the percentage finer or coarser of the total weight is calculated. The results of these tests are presented at the end of this report.

Design Recommendations

Three (3) infiltration tests were performed at the subject site. As noted above, the calculated infiltration rates at the infiltration test locations range from 1.0 to 1.7 inches per hour. The primary factors affecting the infiltration rates are the varying relative densities, and the clay and silt content of the encountered soils, which vary at different depths and locations at the subject site. In general, dense clayey sands were encountered at the bottom of Infiltration Test No. I-1, which exhibited a slower infiltration rate.

Based on the infiltration test results, we recommend a design infiltration rate of 1 inch per hour be used for the proposed infiltration basin located in the southeastern corner of the subject site.

The design of the proposed storm water infiltration system should be performed by the project civil engineer, in accordance with the City of Perris and/or County of Riverside guidelines. However, it is recommended that the system be constructed so as to facilitate removal of silt and clay, or other deleterious materials from any water that may enter the system. The presence of such materials would decrease the effective infiltration rate. **It is recommended that the project civil engineer apply an appropriate factor of safety. The infiltration rate recommended above is based on the assumption that only clean water will be introduced to the subsurface profile. Any fines, debris, or organic materials could significantly impact the infiltration rate.** It should be noted that the recommended infiltration rate is based on infiltration

testing at three (3) discrete locations and the overall infiltration rate of the storm water infiltration system could vary considerably.

Infiltration versus Permeability

Infiltration rates are based on unsaturated flow. As water is introduced into soils by infiltration, the soils become saturated and the wetting front advances from the unsaturated zone to the saturated zone. Once the soils become saturated, infiltration rates become zero, and water can only move through soils by hydraulic conductivity at a rate determined by pressure head and soil permeability. The infiltration rates presented herein were determined in accordance with the ASTM Test Method D-3385-03 standard, and are considered valid for the time and place of the actual test. Changes in soil moisture content will affect these infiltration rates. Infiltration rates should be expected to decrease until the soils become saturated. Soil permeability values will then govern groundwater movement. Permeability values may be on the order of 10 to 20 times less than infiltration rates. The system designer should incorporate adequate factors of safety and allow for overflow design into appropriate traditional storm drain systems, which would transport storm water off-site.

Location of Infiltration Systems

The use of on-site storm water infiltration systems carries a risk of creating adverse geotechnical conditions. Increasing the moisture content of the soil can cause the soil to lose internal shear strength and increase its compressibility, resulting in a change in the designed engineering properties. Overlying structures and pavements in the infiltration areas could potentially be damaged due to saturation of subgrade soils. **The proposed infiltration system for the site should be located at least 25 feet away from any structures, including retaining walls.** Even with this provision of locating the infiltration systems at least 25 feet from any building, it is possible that infiltrating water into the subsurface soils could have an adverse effect on any proposed or existing structure. It should also be noted that utility trenches which happen to collect storm water can also serve as conduits to transmit storm water toward the structure, depending on the slope of the utility trench. Therefore, consideration should also be given to the proposed locations of underground utilities which may pass near the proposed infiltration system.

General Comments

This report has been prepared as an instrument of service for use by the client in order to aid in the evaluation of this property and to assist the architects and engineers in the design and preparation of the project plans and specifications. This report may be provided to the contractor(s) and other design consultants to disclose information relative to the project. However, this report is not intended to be utilized as a specification in and of itself, without appropriate interpretation by the project architect, structural engineer, and/or civil engineer. The design of the infiltration system is the responsibility of the civil engineer. The role of the geotechnical engineer is limited to determination of infiltration rate only. By using the design infiltration rates contained herein, the civil engineer agrees to indemnify, defend, and hold harmless the geotechnical engineer for all aspects of the design and performance of the infiltration system. The reproduction and distribution of this report must be authorized by the client and Southern California Geotechnical, Inc. Furthermore, any reliance on this report by an unauthorized third party is at such party's sole risk, and we accept no responsibility for damage or loss which may occur.

The analysis of this site was based on a subsurface profile interpolated from limited discrete soil samples. While the materials encountered in the project area are considered to be representative of the total area, some variations should be expected between trench locations and testing depths. If the conditions encountered during construction vary significantly from those detailed herein, we should be contacted immediately to determine if the conditions alter the recommendations contained herein.

This report has been based on assumed or provided characteristics of the proposed development. It is recommended that the owner, client, architect, structural engineer, and civil engineer carefully review these assumptions to ensure that they are consistent with the characteristics of the proposed development. If discrepancies exist, they should be brought to our attention to verify that they do not affect the conclusions and recommendations contained herein. We also recommend that the project plans and specifications be submitted to our office for review to verify that our recommendations have been correctly interpreted.

The analysis, conclusions, and recommendations contained within this report have been promulgated in accordance with generally accepted professional geotechnical engineering practice. No other warranty is implied or expressed.

Closure

We sincerely appreciate the opportunity to be of service on this project. We look forward to providing additional consulting services during the course of the project. If we may be of further assistance in any manner, please contact our office.

Respectfully Submitted,

SOUTHERN CALIFORNIA GEOTECHNICAL, INC.



Scott McCann
Staff Scientist

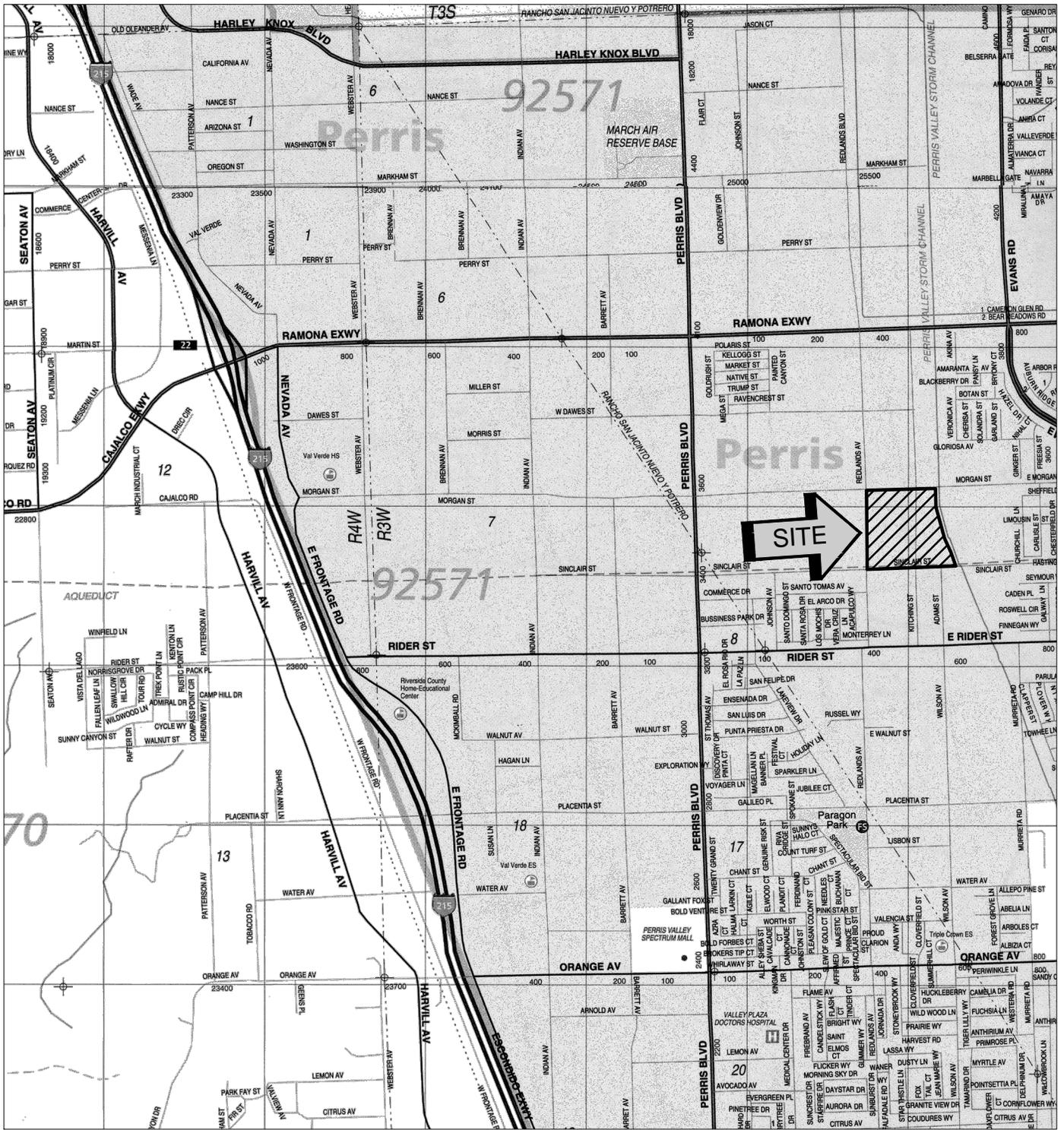


Gregory K. Mitchell, GE 2364
Principal Engineer



Distribution: (1) Addressee

Enclosures: Plate 1 - Site Location Map
Plate 2 - Infiltration Test Location Plan
Trench Logs (3 pages)
Infiltration Test Results Spreadsheets (3 pages)
Grain Size Distribution Graphs (3 pages)



SOURCE: RIVERSIDE COUNTY
THOMAS GUIDE, 2013



SITE LOCATION MAP
RIDER 4 - PROPOSED COMMERCIAL/INDUSTRIAL BUILDING
PERRIS, CALIFORNIA

SCALE: 1" = 2400'

DRAWN: SAM

CHKD: GKM

SCG PROJECT
17G206-2

PLATE 1



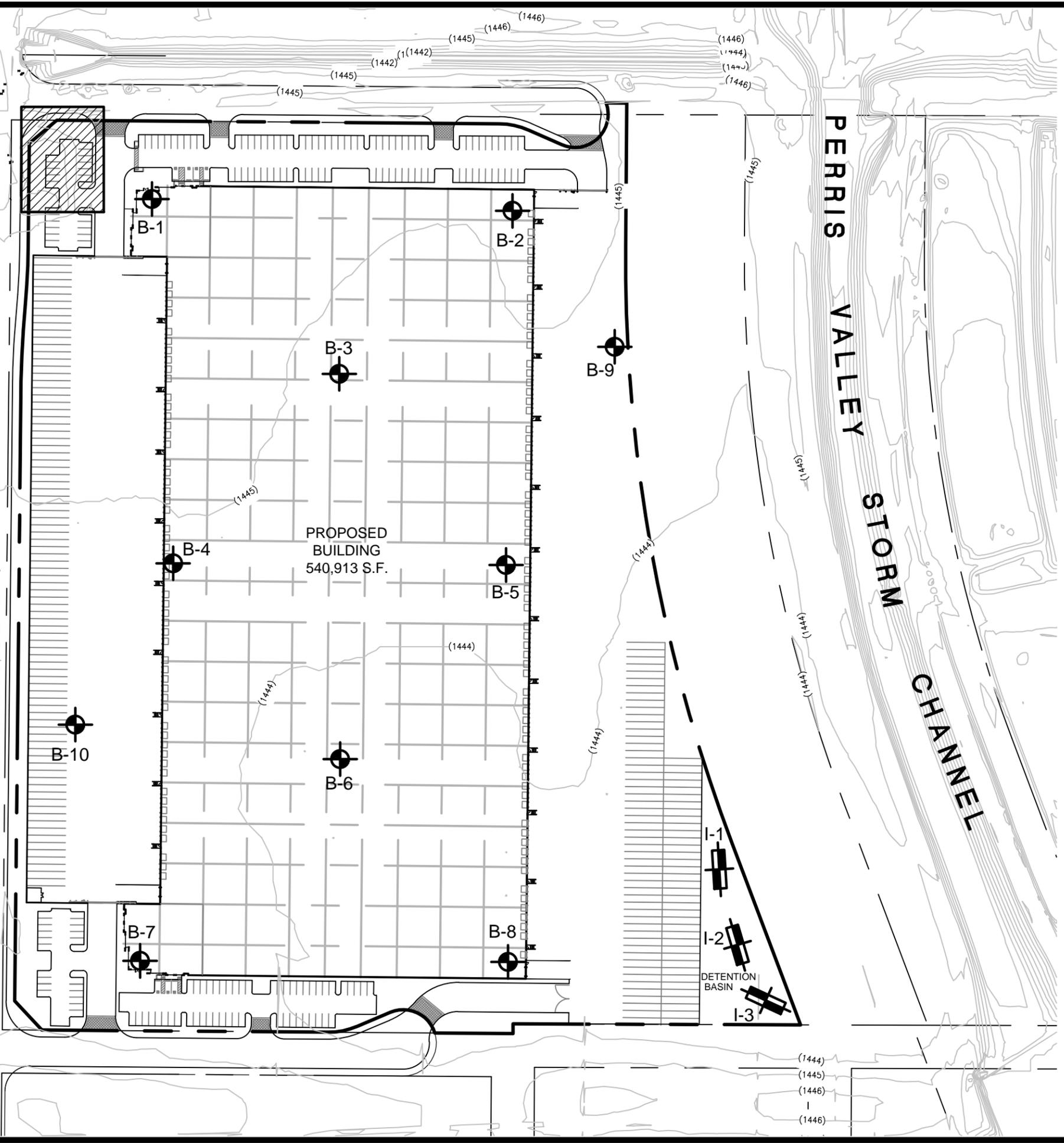
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MORGAN ST.

REDLANDS AVENUE

SINCLAIR ST.

PERRIS VALLEY STORM CHANNEL



GEOTECHNICAL LEGEND

-  APPROXIMATE INFILTRATION TEST LOCATION
-  APPROXIMATE BORING LOCATION (SCG PROJECT NO. 17G206-1)
-  EXISTING PUMP STATION

NOTE: SITE PLAN PREPARED BY ALBERT A. WEBB ASSOCIATES.

INFILTRATION TEST LOCATION PLAN	
RIDER 4 - PROPOSED COMMERCIAL/INDUSTRIAL BUILDING	
PERRIS, CALIFORNIA	
SCALE: 1" = 150'	
DRAWN: JLL CHKD: GKM	
SCG PROJECT 17G206-2	
PLATE 2	SOUTHERN CALIFORNIA GEOTECHNICAL

SOUTHERN CALIFORNIA GEOTECHNICAL

**TRENCH NO.
I-1**

JOB NO.: 17G206-2	EQUIPMENT USED: Backhoe	WATER DEPTH: Dry
PROJECT: Rider 4 - Proposed C/I Building	LOGGED BY: Scott McCann	SEEPAGE DEPTH: Dry
LOCATION: Perris, CA	ORIENTATION: N 4 W	READINGS TAKEN: At Completion
DATE: 11-9-2017	TOP OF TRENCH ELEVATION: 1443.5 feet msl	

DEPTH	SAMPLE	DRY DENSITY (PCF)	MOISTURE (%)	EARTH MATERIALS DESCRIPTION	GRAPHIC REPRESENTATION
<div style="text-align: center;">5</div> <div style="text-align: center;">10</div> <div style="text-align: center;">15</div>				<p>A: ALLUVIUM: Light Brown fine Sandy Silt, little medium Sand, trace to abundant fine root fibers, slightly porous, medium dense to dense - damp to moist</p> <p>B: ALLUVIUM: Light Gray Brown Silty Clay, little fine to medium Sand, little calcareous veining, stiff - damp to moist</p> <p>C: ALLUVIUM: Light Gray Brown Clayey fine to coarse Sand, trace fine Gravel, trace Silt, little calcareous veining, dense - moist</p> <p>D: ALLUVIUM: Brown Clayey fine to medium Sand, trace calcareous veining, dense - moist</p> <p style="text-align: center;">Trench Terminated @ 12.5 feet Bottom of Trench Elevation: 1431 feet msl</p>	<p>N 4 W →</p> <p style="text-align: right;">SCALE: 1" = 5'</p>

KEY TO SAMPLE TYPES:
 B - BULK SAMPLE (DISTURBED)
 R - RING SAMPLE 2-1/2" DIAMETER
 (RELATIVELY UNDISTURBED)

SOUTHERN CALIFORNIA GEOTECHNICAL

**TRENCH NO.
I-3**

JOB NO.: 17G206-2

EQUIPMENT USED: Backhoe

WATER DEPTH: Dry

PROJECT: Rider 4 - Proposed C/I Building

LOGGED BY: Scott McCann

SEEPAGE DEPTH: Dry

LOCATION: Perris, CA

ORIENTATION: S 66 E

READINGS TAKEN: At Completion

DATE: 11-9-2017

TOP OF TRENCH ELEVATION: 1444 feet msl

DEPTH	SAMPLE	DRY DENSITY (PCF)	MOISTURE (%)	EARTH MATERIALS DESCRIPTION	GRAPHIC REPRESENTATION
<p>5</p> <p>10</p> <p>15</p>				<p>A: ALLUVIUM: Light Brown fine Sandy Silt, trace medium Sand, trace to abundant fine root fibers, slightly porous, medium dense to dense - damp</p> <p>B: ALLUVIUM: Light Gray Brown Silty Clay, little fine Sand, little calcareous veining, stiff - damp to moist</p> <p>C: ALLUVIUM: Gray Brown fine Sandy Clay, little Silt, trace medium Sand, trace calcareous veining, medium stiff - moist</p> <p>D: ALLUVIUM: Brown Clayey fine to medium Sand, trace Silt, dense - moist</p> <p>Trench Terminated @ 13 feet Bottom of Trench Elevation: 1431 feet msl</p>	<p>S 66 E →</p> <p>SCALE: 1" = 5'</p>

KEY TO SAMPLE TYPES:
B - BULK SAMPLE (DISTURBED)
R - RING SAMPLE 2-1/2" DIAMETER
(RELATIVELY UNDISTURBED)

TRENCH LOG

PLATE B-3

INFILTRATION CALCULATIONS

Project Name	Rider 4 - Proposed Commercial/Industrial Building
Project Location	Perris, CA
Project Number	17G206-2
Engineer	Scott McCann

Infiltration Test No I-1

Constants			
	Diameter (ft)	Area (ft ²)	Area (cm ²)
Inner	1	0.79	730
Anlr. Spac	2	2.36	2189

*Note: The infiltration rate was calculated based on current time interval

Test Interval		Time (hr)	Interval Elapsed (min)	Flow Readings				Infiltration Rates			
				Inner Ring (ml)	Ring Flow (cm ³)	Annular Ring (ml)	Space Flow (cm ³)	Inner Ring* (cm/hr)	Annular Space* (cm/hr)	Inner Ring* (in/hr)	Annular Space* (in/hr)
1	Initial	1:40 PM	20	100	1100	500	3600	4.52	4.93	1.78	1.94
	Final	2:00 PM	20	1200		4100					
2	Initial	2:01 PM	20	1250	850	100	2600	3.49	3.56	1.38	1.40
	Final	2:21 PM	41	2100		2700					
3	Initial	2:22 PM	20	100	625	0	2400	2.57	3.29	1.01	1.30
	Final	2:42 PM	62	725		2400					
4	Initial	2:43 PM	20	0	600	0	2250	2.47	3.08	0.97	1.21
	Final	3:03 PM	83	600		2250					
5	Initial	3:04 PM	20	50	600	200	2200	2.47	3.02	0.97	1.19
	Final	3:24 PM	104	650		2400					
6	Initial	3:25 PM	20	200	600	900	2100	2.47	2.88	0.97	1.13
	Final	3:45 PM	125	800		3000					
7	Initial	3:46 PM	20	100	600	600	2100	2.47	2.88	0.97	1.13
	Final	4:06 PM	145	700		2700					

INFILTRATION CALCULATIONS

Project Name	Rider 4 - Proposed Commercial/Industrial Building
Project Location	Perris, CA
Project Number	17G206-2
Engineer	Scott McCann

Infiltration Test No I-2

Constants			
	Diameter (ft)	Area (ft ²)	Area (cm ²)
Inner	1	0.79	730
Anlr. Spac	2	2.36	2189

*Note: The infiltration rate was calculated based on current time interval

Test Interval		Time (hr)	Interval Elapsed (min)	Flow Readings				Infiltration Rates			
				Inner Ring (ml)	Ring Flow (cm ³)	Annular Ring (ml)	Space Flow (cm ³)	Inner Ring* (cm/hr)	Annular Space* (cm/hr)	Inner Ring* (in/hr)	Annular Space* (in/hr)
1	Initial	10:30 AM	20	200	1800	200	6500	7.40	8.91	2.91	3.51
	Final	10:50 AM	20	2000		6700					
2	Initial	10:51 AM	20	50	1650	300	6000	6.78	8.22	2.67	3.24
	Final	11:11 AM	41	1700		6300					
3	Initial	11:12 AM	20	150	1500	150	5600	6.17	7.68	2.43	3.02
	Final	11:32 AM	62	1650		5750					
4	Initial	11:33 AM	20	2100	1250	4400	4800	5.14	6.58	2.02	2.59
	Final	11:53 AM	83	3350		9200					
5	Initial	11:54 AM	20	900	1150	1700	4500	4.73	6.17	1.86	2.43
	Final	12:14 PM	104	2050		6200					
6	Initial	12:15 PM	20	550	1075	1200	4400	4.42	6.03	1.74	2.37
	Final	12:35 PM	125	1625		5600					
7	Initial	12:36 PM	20	700	1050	1500	4400	4.32	6.03	1.70	2.37
	Final	12:56 PM	145	1750		5900					
8	Initial	12:57 PM	20	2750	1050	200	4400	4.32	6.03	1.70	2.37
	Final	1:17 PM	166	3800		4600					

INFILTRATION CALCULATIONS

Project Name	Rider 4 - Proposed Commercial/Industrial Building
Project Location	Perris, CA
Project Number	17G206-2
Engineer	Scott McCann

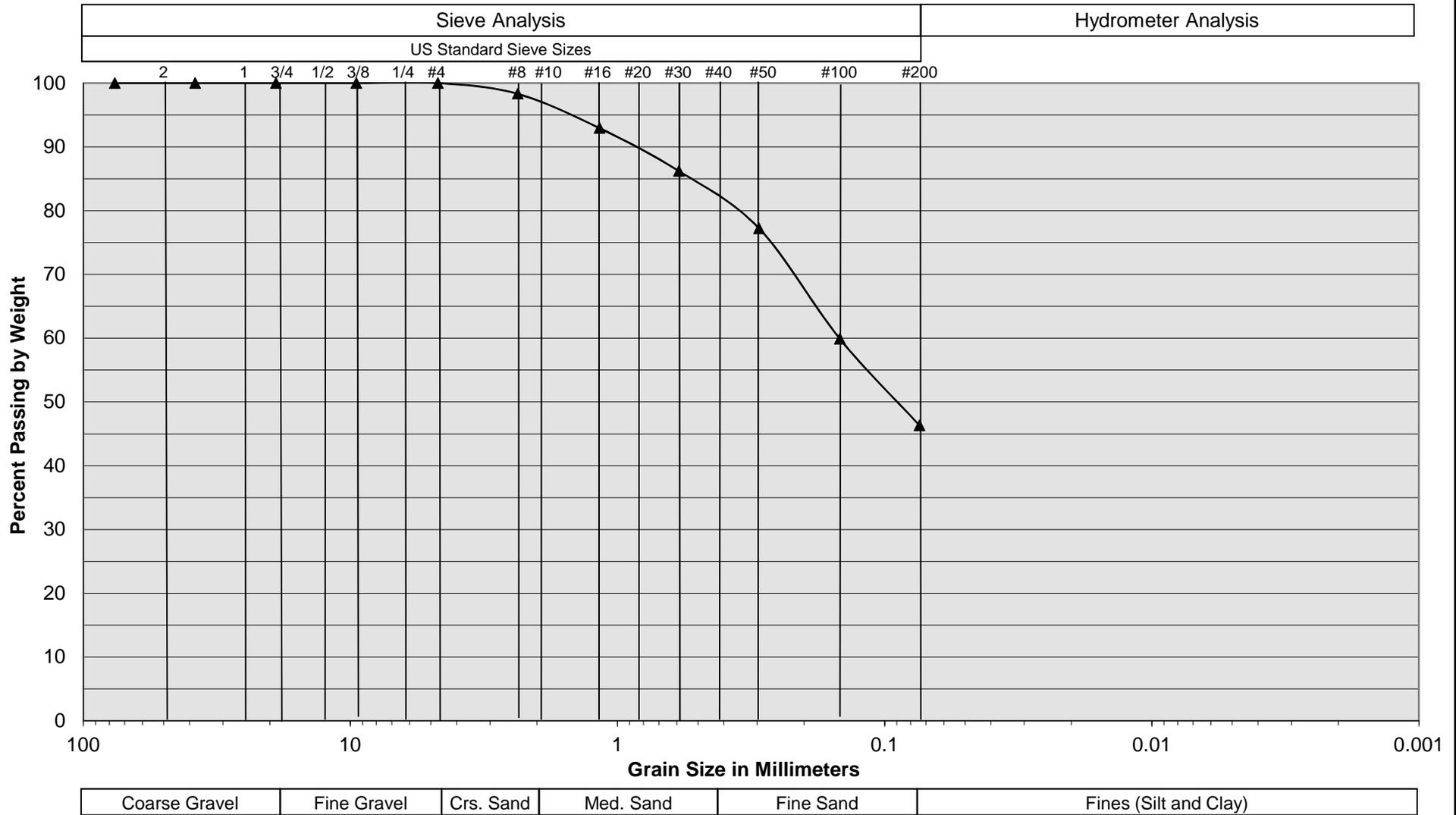
Infiltration Test No I-3

Constants			
	Diameter (ft)	Area (ft ²)	Area (cm ²)
Inner	1	0.79	730
Anlr. Spac	2	2.36	2189

*Note: The infiltration rate was calculated based on current time interval

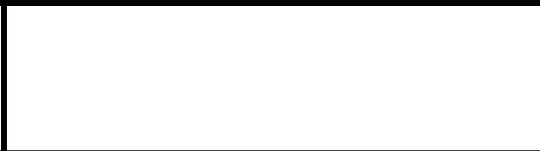
Test Interval		Time (hr)	Interval Elapsed (min)	Flow Readings				Infiltration Rates			
				Inner Ring (ml)	Ring Flow (cm ³)	Annular Ring (ml)	Space Flow (cm ³)	Inner Ring* (cm/hr)	Annular Space* (cm/hr)	Inner Ring* (in/hr)	Annular Space* (in/hr)
1	Initial	11:00 AM	20	50	1500	200	5100	6.17	6.99	2.43	2.75
	Final	11:20 AM	20	1550		5300					
2	Initial	11:21 AM	20	0	1100	0	4500	4.52	6.17	1.78	2.43
	Final	11:41 AM	41	1100		4500					
3	Initial	11:42 AM	20	150	975	600	4350	4.01	5.96	1.58	2.35
	Final	12:02 PM	62	1125		4950					
4	Initial	12:03 PM	20	50	925	900	4200	3.80	5.76	1.50	2.27
	Final	12:23 PM	83	975		5100					
5	Initial	12:24 PM	20	50	900	200	4100	3.70	5.62	1.46	2.21
	Final	12:44 PM	104	950		4300					
6	Initial	12:45 PM	20	200	850	500	4100	3.49	5.62	1.38	2.21
	Final	1:05 PM	125	1050		4600					
7	Initial	1:06 PM	20	100	850	400	4100	3.49	5.62	1.38	2.21
	Final	1:26 PM	145	950		4500					
8	Initial	1:27 PM	20	150	850	100	4100	3.49	5.62	1.38	2.21
	Final	1:47 PM	166	1000		4200					

Grain Size Distribution



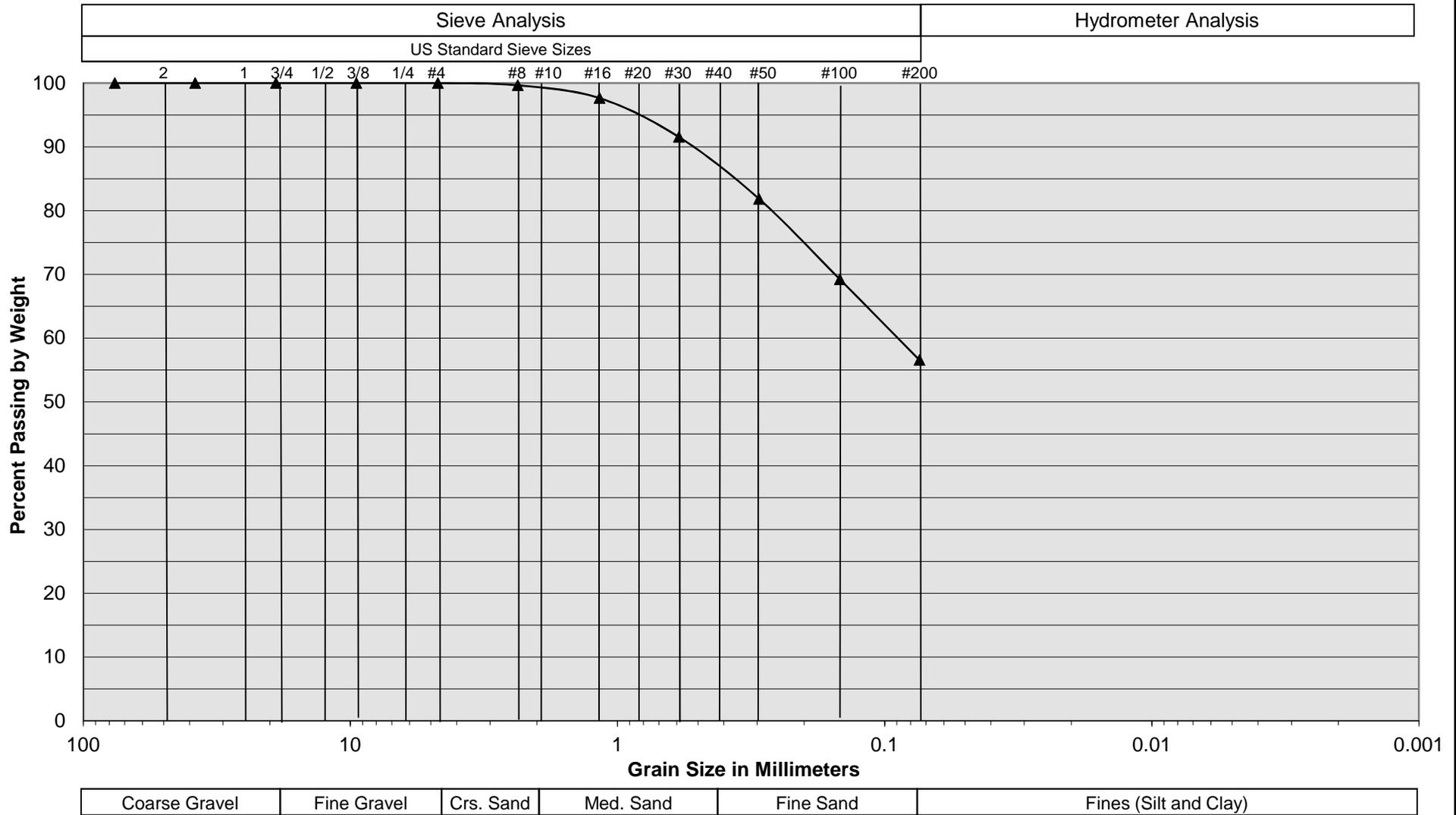
Sample Description	I-1 @ 12.5 feet
Soil Classification	Brown Clayey fine to medium Sand

Rider 4 - Proposed Commercial/Industrial Building
 Perris, California
 Project No. 17G206-2
PLATE C-1



SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Grain Size Distribution



Grain Size Distribution

